



Please write clearly in block capitals.

Centre number

--	--	--	--	--

Candidate number

--	--	--	--

Surname \_\_\_\_\_

Forename(s) \_\_\_\_\_

Candidate signature \_\_\_\_\_

# Level 3 Certificate/Extended Certificate

## APPLIED SCIENCE

Unit 1 Key Concepts in Science  
Section C – Physics

Tuesday 22 January 2019

Morning

Time allowed: 1 hour 30 minutes.  
You are advised to spend  
approximately 30 minutes on this  
section.

### Materials

For this paper you must have:

- a calculator
- Formulae Sheet.

### Instructions

- Use black ink or black ball-point pen.
- Answer **all** questions in each section.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Do all rough work in this book. Cross through any work you do not want to be marked.

### Information

- You will be provided with a copy of the Formulae Sheet.
- There are three sections in this paper:  
**Section A** – Biology      **Section B** – Chemistry      **Section C** – Physics.
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60 and the maximum mark for this section is 20.

### Advice

Read each question carefully.

For Examiner's Use	
Question	Mark
1	
2	
<b>TOTAL</b>	



J A N 1 9 A S C 1 P O 1

1B/M/Jan19/E7

**ASC1P**

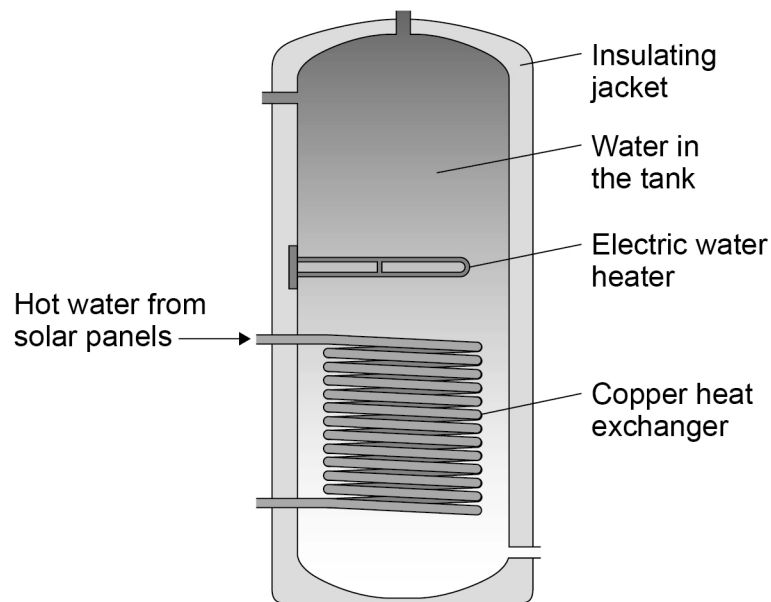
## Section C – Physics

Do not write  
outside the  
boxAnswer **all** questions in this section.

0 1

Solar water heating systems use sunlight to heat water.

Hot water from the solar panels goes through a heat exchanger and heats the water in a hot water storage tank.

**Figure 1** shows a hot water storage tank.**Figure 1**

0 1 . 1

Give **two** ways the heat exchanger maximises the energy transfer from the solar panels to the water in the hot water storage tank.**[2 marks]**

- 1 \_\_\_\_\_
- \_\_\_\_\_
- 2 \_\_\_\_\_
- \_\_\_\_\_



0 1 . 2

Suggest why the hot water storage tank also has an electric water heater.

[2 marks]

---

---

---

---

---

---

0 1 . 3

A heating engineer wants to calculate the U-value of the insulating jacket around the hot water storage tank.

The heating engineer knows:

- the surface area of the insulating jacket
- how much heat is lost through the insulating jacket each second.

Give **two** measurements the heating engineer must make in order to calculate the U-value of the insulating jacket.

[2 marks]

1 \_\_\_\_\_

---

2 \_\_\_\_\_

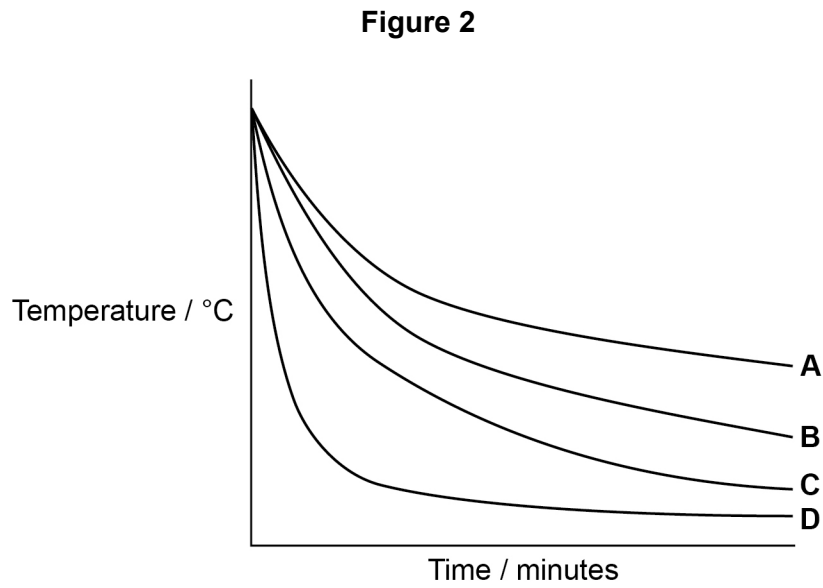
---

**Question 1 continues on the next page**

**Turn over ►**



**Figure 2** shows the cooling curves for the hot water storage tank when it is fitted with four different insulating jackets **A**, **B**, **C** and **D**.



**0 1 . 4** Which insulating jacket has the lowest U-value?

Tick (✓) **one** box.

[1 mark]

**A**

**B**

**C**

**D**

**0 1 . 5** Explain your answer to Question **01.4**.

[1 mark]

---



---



**Turn over for the next question**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**

**Turn over ►**



**0 2**

In the UK, approximately 3% of cars sold are electric.

**0 2 . 1**

Give **one** advantage and **one** disadvantage of using an electric car compared to a car powered by a petrol engine.

**[2 marks]**

Advantage \_\_\_\_\_

\_\_\_\_\_

Disadvantage \_\_\_\_\_

\_\_\_\_\_

**0 2 . 2**

Tests are being performed on a new model of electric car.

The car contains a 360 V battery that provides a power of 72 kW during a particular test.

Calculate the current from the battery during the test.

State the correct unit in your answer.

**[3 marks]**

Current from the battery = \_\_\_\_\_ Unit = \_\_\_\_\_

**0 2 . 3**

The battery can deliver a charge of  $9.1 \times 10^5$  C before it needs to be recharged.

Show that the time taken before the battery needs to be recharged is approximately 76 minutes.

**[2 marks]**

**0 2 . 4** The car is driven on a horizontal test track at a constant speed of  $24 \text{ m s}^{-1}$ .

Calculate the maximum distance, in metres, the car can travel at a speed of  $24 \text{ m s}^{-1}$  on the horizontal test track.

**[2 marks]**

Maximum distance = \_\_\_\_\_ m

**0 2 . 5** A further test is now performed on the car.

The car is driven **downhill** at a constant speed of  $24 \text{ m s}^{-1}$ .

The current from the battery is less than the current calculated in Question **02.2**

Explain why the current is less.

**[3 marks]**

---

---

---

---

---

---

---

---

---

---

12

**END OF QUESTIONS**



**There are no questions on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**





**There are no questions printed on this page**

*Do not write  
outside the  
box*

**DO NOT WRITE ON THIS PAGE  
ANSWER IN THE SPACES PROVIDED**



0 9





